I. INTRODUCTION

1.1 Background

South Kalimantan province is one of area in Indonesia where the population of Bali cattle is high supporting the vision of the Animal Husbandry Office as producer of beef cattle in Kalimantan Island. Several challenges have to be faced to increasing the beef cattle population, including the animal disease outbreak that affected the beef productivity directly and indirectly. One of animal disease that usually attacks Bali cattle is jembrana disease (JD). JD is a major threat to the success of the various Bali cattle distribution programs and consequently to the attempts to alleviate poverty and increase food production in Indonesia.

Jembrana Disease (JD) is an acute and severe disease of Bali cattle (Bos javanicus) that is caused by Jembrana Disease Virus (JDV) which is a member of the lentivirus genus of the family Retroviridae. It is endemic in parts of Indonesia (Setiyaningsih 2006) and resulting in heavy economic losses because of the high mortalities (Kusumawati et al. 2010). JD causes high economical losses reaching US $3 million (Suwiti 2010). The major clinical signs of JD are depression, anorexia, fever, enlargement of the superficial lymph node, and blood sweating (Subronto 2003). Infection of Bali cattle with JDV results in a case fatality rate of approximately 20%, and the remainders survive with no recurrence of disease (Soesanto et al. 1990).

JD is one of strategic diseases due to specific on the Bali cattle and is found only in Indonesia. There are no effective drugs for JDV treatment. Disease prevention is mainly by vaccination, although not provide maximum protection against cattle (Suwiti 2010). The epidemiological factors contributing to occurrence of JD are unknown. Movement of livestock, especially Bali cattle, probably becomes one factor that affecting the JD outbreak. The JD incidence occurs all year round with sporadic outbreaks and usually occurs at the end of dry season or at the beginning of the wet season.

JD has become main concern of animal disease eradication program of Animal Husbandry Office of South Kalimantan Province. The first case in South
Kalimantan was found in 1993 in Tanah Laut and is now endemic in the areas of Kotabaru, Tanah Laut, Tanah Bumbu, and Barito Kuala. There are still some outbreaks in South Kalimantan every year and cause losses suffered by farmers (DISNAK KALSEL 2009). The losses of this disease include the death of cattle and additional costs for treatment. Local government also spends much money and time to prevent and eradicate this disease through vaccination and conduct public awareness for farmers.

Geographic Information System (GIS) are now used in many different areas including town planning, ecology, and utility management, reflecting the importance of the spatial dimension to most processes occurring in the world (Pfeiffer et al. 2008). GIS has been widely used in several major field areas. GIS is used for surveying and mapping, forest resource inventory, harvest planning, wildlife management and conservation, mining and mineral exploration.

In public health, GIS is used for pattern and spread disease, distribution and delivery of health services (Lo and Yeung 2007).

GIS have become an important tool in modern animal disease control. The potential applications for GIS in animal disease control range from use in epidemiological field studies and simulation to use in animal disease surveillance. The main two areas of use in epidemiological field studies include the visual display of geographical patterns and spatial analysis. In the area of disease surveillance GIS can be used to produce maps of disease occurrence and it can be part of a sophisticated animal disease information system. In the field of veterinary epidemiology, GIS has been used widely in field research for visual appraisal and to provide data for advanced spatial analyses (Pfeiffer et al. 1994).

GIS combined with methods of spatial analysis provide powerful new tools for understanding the epidemiology of diseases and for improving disease prevention and control (Chaput et al. 2002). GIS technology is used for spatial distribution and analysis for the several diseases eradication program. For example, Allepuz (2008) explained the spatial analysis of Aujeszky’s disease eradication in Catalonia, Spain. Haghdoost et al. (2007) used GIS to explain the spatial distribution of brucellosis in endemic district in Iran. Chen et al. (2007) also conducted spatial analysis for Schistosomiasis japonica control in different

Disease mapping and spatial analysis to explore the nature of such spatial distributions has been widely used in risk modeling to identify high-risk areas or geographically – related risk areas. An objective of such efforts is to identify high risk areas that could subsequently be targeted for control, eradication, and prevention action (Chhetri et al. 2010). Spatial analysis deals with the exploration, description and analysis of data taking into account their geographical distribution (Saez and Saurina 2007 in Allepuz 2008).

Spatial analysis involves the analysis of data representing geographical features which have a location attribute such as absolute location (coordinates) or relative positioning (distance). Disease occurrence produces a spatial point pattern where each point pattern could be the result of infectiousness or environmental factors. The objectives of spatial analysis are to identify areas of locally increased risk and of factors resulting in spatial interaction which cause, for example increased transmission probabilities (Pfeiffer and Morris 1994).

In Indonesia, studies on the epidemiology of animal disease rarely consider the spatial dimension of disease prevalence. This study presents a study combining surveillance, laboratory diagnostic method, and GIS for spatial analysis of JD pattern to better understand its epidemiology. This study would help in developing detection, surveillance, and control strategies of JD in South Kalimantan province, and supporting the local government to conduct the JD eradication program.

1.2 Objective

The main objective of this study is to conduct a spatial analysis of JD in South Kalimantan Province. This study presents a spatial distribution of JD, identify the JD cluster, generate JD mapping, and identifying factors associated with the spatial distribution of JD in South Kalimantan Province.